CONTAINER

Background of the Invention

1. Field of the Invention

This invention relates to containers and, in particular, this invention relates to containers having lids achieving substantially air-tight seals.

2. Background

Many substances must be protected from ambient air during storage, transport, and use. These substances include building materials, such as paints, plasters, and wood fillers. Typically, these substances are stored, transported, and used out of containers having lids. The lids can be removed when the substance is being used, then replaced to maintain an air-type seal to protect the substance therein. Many of these containers and lids have been made from metals or stiff synthetic resins. Because of the stiffness of these materials, the lids are easily removed and replaced. However, recently containers and lids have been made from synthetic resins which are pliable and resilient in nature. Containers made from these materials offer advantages, such as resistance to denting and bending during storage, transport, and use. However, it has been more difficult to remove lids made from these more pliable and resilient materials. Using digits or tools to pry open these lids often simply flexes the lids, but fails to remove them. To this end, a flange has been formed proximate an upper end of the container. The flange is situated such that a gap exists between the flange and the container lid. Removing the container lid when a flange is present has involved inserting a tool, then twisting or levering the tool to displace the container lid. While this has been an

improvement over existing container designs, twisting or levering tools has still often flexed, rather than removed, the container lids.

There is then a need for a container with a flange facilitating removal of a substantially flexible lid therefrom. There is a particular need for a container with a flange allowing insertion of a tool or use of a digit to more effectively pry, push, or pull a substantially flexible lid from an air-tight sealing contact with the container.

Summary of the Invention

This invention substantially meets the aforementioned needs of the industry by providing a container, which facilitates insertion of a tool or use of a digit to more effectively remove a lid from the container.

A container is provided, which includes a body portion, a base portion, and a flange member. The body portion may include a top edge and a bottom edge. The base portion may form a fluid-tight bond with the body portion proximate the body portion bottom edge. The flange member may radially extend from the body portion and may define a gap, in which the flange is not present and in which an outer surface of the body portion is exposed.

A process of manufacturing a container is also provided. The process may include 1) forming a container body with an upper edge and an outer surface; 2) joining a base to the container body; and 3) attaching a flange to the container body proximate the container body upper edge such that the flange defines a gap exposing the container body outer surface. In certain embodiments of this invention the container may be unitary, or otherwise integral and the foregoing steps may be conducted simultaneously, e.g., by injection molding.

A process of placing a substance in a container is also provided. The process may include substantially filling the container with the substance. Steps in this process may include 1) providing the container, the container including a body portion, a base attached to the body portion proximate a body portion lower end, and a flange circumferentially extending around the body portion proximate a body portion top. A gap may be defined by the flange, wherein a portion of an outer surface of the body portion is exposed; 2) conveying the substance into the container; and 3) accommodating the body portion top end by a lid, thereby closing the container with a substantially air-tight seal.

It is a feature of the present container to include a flange with a gap, the gap exposing an outer surface of the container body.

It is one advantage of the foregoing feature that the gap facilitates removal of a substantially flexible lid from the container.

One way removal of a substantially flexible lid is facilitated is that the gap allows deeper insertion of tools beneath a lip of the lid.

Another way removal of a substantially flexible lid is facilitated is that the gap admits a digit to push or pull the lid, thereby facilitating removal of the lid.

These and other features and advantages of this invention will become apparent from the description which follows, and when considered in view of the accompanying drawings.

Brief Description of the Drawings

Figure 1 is a perspective view of a container of the prior art with a lid disposed thereon;

Figure 2 is a perspective view of one embodiment of a container of the present invention;

Figure 3 is a side view of the container of Figure 2;

Figure 4 is a plan view of the container of Figure 2;

Figure 5 is a cross sectional view of the container of Figure 4 taken along line 5-5;

Figure 6 is a is a partial cross sectional view of the container of Figure 4 taken along line 6-6; and

Figure 7 is a side view of an upper portion of the present container with a lid disposed thereon.

It is understood that the above-described figures are only illustrative of the present invention and are not contemplated to limit the scope thereof.

Detailed Description

Any references to such relative terms as top and bottom, upper and lower, horizontal and vertical, or the like, are intended for convenience of description and are not intended to limit the present invention or its components to any one positional or spatial orientation. All dimensions of the components in the attached figures may vary with a potential design and the intended use of an embodiment of the invention without departing from the scope of the invention. Each of the features and methods disclosed herein may be utilized separately or in conjunction with other features and methods to provide improved containers and methods for making and using the same. Representative examples of the teachings of the present invention, which examples utilize many of these additional features and methods in conjunction, will now be described in detail with reference to the drawings. This detailed

description is merely intended to teach a person of ordinary skill in the art further details for practicing preferred aspects of the present teachings and is not intended to limit the scope of the invention.

A container 50 and a lid 52 of the prior art are depicted in Figure 1. The lid 52 is configured to fit snugly over an upper portion of the container 50 so as to achieve an air-tight fit. The lid 52 is made from a substantially flexible material such as high density polyethylene. However, the lid can be made from other materials as well. Other exemplary materials from which the lid 52 can be made are fully discussed infra with respect to the container of this invention. The container 50 includes, inter alia, a container body 54 and a flange 56. The flange 56 is usually present, inter alia, to provide a base for a tool when the lid 52 is wedged or pried from the container 50. In most embodiments, a gap 58 is formed between the lid 52 and the flange 56. Functionally, the gap provides a space to insert a tool for removing the lid 52 from the container 50. While providing a space for tool insertion, the flange 56 and gap 58 have frequently proven inadequate for removing the lid 52. Because of the flexibility of the materials used to make the lid 52, tools inserted in the gap 58 frequently flex the bottom of the lid 52, rather than removing the lid 52 as desired.

Referring to Figures 2-7, one embodiment of the container of this invention is depicted generally at 100. The container 100 may be unitarily (or otherwise integrally) formed from a synthetic resin, e.g., by injection molding or by other equivalent protocols readily comprehended by a person of ordinary skill in the art without undue experimentation. In the embodiment depicted, the container 100 is generally unitary (or otherwise integral), but may be considered to include a body portion 102, a base portion 104, and a flange 106.

In the embodiment shown and referring especially to Figures 3 and 5, the body 102, in turn, may be considered to include a first section, such as a generally frustoconical section 110 and a second section, such as a generally cylindrical section 112. The frustoconical section 110 extends between the lower edge 116 and a junction 118 of the frustoconical section and the cylindrical section. Also in the embodiment depicted, the cylindrical section 112 is offset radially from the frustoconical section 110, such that the junction 118 may be described by respective outer and inner radii 119 and 119.1, e.g., 0.031 inch. The cylindrical section 112, in turn, extends between the upper edge 114 and the junction 118. A lip 120 may be present to extend radially from the cylindrical section 112 proximate the upper edge 114. In the embodiment depicted, the frustoconical section 110 angles inwardly from the cylindrical section 112, e.g., by an angle 122 of between about three degrees and six degrees, between about four degrees and five degrees, or about 4.5 degrees. The present container will have an overall height dimension 124, a top inner dimension (e.g., diameter) 126, a top outer dimension (e.g., diameter) 127, a bottom dimension (e.g., diameter) 128, a height dimension 130 of the cylindrical section 112, and a height dimension 132 of the frustoconical section 110, each dimension determined in part by the volume accommodated by the container of this invention. In the embodiment depicted, containers with a ratio of the top diameter 126 to the bottom diameter 128 of between about 0.5 and 3.0, between about 0.75 and 1.25, or about 1.27 have been satisfactory.

The present container may also be characterized by a wall thickness 136 and a lip height 138, e.g., 0.70 inch (17.78 millimeters). Further with respect to the lip 120 and referring to Figures 5 and 6, the lip 120 is bounded by an internal surface 140, an upper surface 141, and respective first and second external surfaces 142 and 144. In the

embodiment shown, the first external surface 142 extends from the horizontal at an angle 146 between about 55 degrees and 85 degrees, between about 60 degrees and 80 degrees, or about 75 degrees. Similarly, the second external surface 144 extends from the horizontal by an angle 148 between about 35 degrees and 55 degrees, between about 40 degrees and 50 degrees, or about 45 degrees.

Referring to Figure 5, the present base 104 may be characterized by a thickness dimension 150 (e.g., about 0.026 inch (0.660 millimeter)) and is unitarily, or otherwise integrally, joined to the body 102 at a junction 151 proximate the lower edge 116. Beneath the base 104 the frustoconical section 110 defines a lip 152 extending between the lower edge 116 and a lower surface of the base 104, the lip characterized by a height dimension 154 such as about 0.063 inch (0.340 millimeter).

The present flange 106 provides a maximum horizontal dimension (e.g., diameter) 168 to the present container, e.g., about 0.173 inch (4.394 millimeters) (Figure 3) and includes respective first and second flange elements 170 and 172 (Figure 5). The first flange element 170 unitarily, or otherwise integrally, extends orthogonally (or otherwise transversely) from the cylindrical element 112 and the second flange element 172 extends orthogonally (or otherwise transversely) from a radial end 174 of the first flange element 170. The present flange may also be characterized by a height dimension 178 of the second flange element 172 (e.g., about 0.225 inch or 5.715 millimeter), and a distance dimension 180 characterizing the dimension spanning the upper edge 114 and an upper surface of the first flange element 170.

An access facilitator, such as a gap 182 is advantageously displayed in the present container (Figures 2-4 and 7). The gap 182 may be described by the absence of the present flange 106 in an arc dimension 186 of between about 10 degrees and 40 degrees, between

about 10 degrees and 30 degrees, or about 20 degrees. However, in its broadest sense, the present access facilitator is contemplated to include any structure or lack of structure wherein access to the lid 52 is enhanced.

A reinforcing structure, such as a multiplicity of ribs 188, may unitarily, or otherwise integrally, span between an outer surface of the cylindrical element 112 and the first and second flange elements 170 and 172 of the flange 106. Functionally, the ribs 188 serve to provide additional rigidity to the flange 106. Referring particularly to Figure 6, a bottom edge 190 of each rib 188 may be characterized by respective first and second radii 192 and 194. The radius 192 describes the curvature of the bottom edge 190 proximate the junction of the bottom edge 190 and the cylindrical element 112 and proximate the junction of the bottom edge 190 and the second flange element 172, respectively. The second radius 194 describes the curvature of the bottom edge 190 between those portions of the bottom edge 190 described by the first radius 192. In the embodiment described, each bottom edge 190 of each rib 188 is generally symmetrical and, hence, can be linearly described by a distance 196 between an origin 198 and a midpoint 200. A rib thickness dimension 202(shown in Figure 4) of about 0.024 inch (0.610 millimeter) has been found suitable for some embodiments. The number of ribs 188 present in the container 100 will be determined by such factors as the extent of the rigidity desired with respect to the present flange and the size of the container. However, it has been found that between about 15 and 30 ribs, between about 20 and 25 ribs, or between about 20 and 22 ribs have imparted an acceptable degree of support and rigidity to exemplary containers more fully described herein. For example in a one-quarter pint container more fully discussed below, the ribs 188 will be present at each 15 degree increment to strengthen the present flange.

The gap 182 may also be described by a specific circumferential dimension in some embodiments of the present container. For example, a gap 182 occupying a circumferential dimension 182, as measured along the outer (circumferential) surface 186 of the cylindrical section 112, may occupy a dimension between about 1 centimeter and 3 centimeters, between about 1.5 centimeters and 2.5 centimeters, or about two centimeters. The extent of the body portion exposed by the present gap may also be described radially for some embodiments, e.g., between about five degrees and 40 degrees, between about 10 degrees and 30 degrees, or about 20 degrees.

Without limitation, a person of ordinary skill in the art would readily vary the dimensions and thicknesses of the present container without undue experimentation to design and make containers for any of a wide range of contents and to accommodate several capacities. For example, in the embodiment of the present invention depicted, fluid capacities of 1 quart (approximately 986 milliliters), 1 pint (approximately 473 milliliters), one-half pint (approximately 236.5 milliliters), and one-quarter pint (approximately 118.25 milliliters) are arbitrarily contemplated.

For a one-quarter pint container having a fill line dimension 204 of about 2.275 inches (57.785 millimeters), a total height dimension 124 of about 2.640 (+/- 0.061) inches (67.056 (+/- 1.549) millimeters), a top inner diameter 126 of about 2.249 (+/- 0.020) inches (57.125 (+/- 0.508) millimeters), a top outer dimension 127 of about 2.354 (+/- 0.019) inches (59.792 (+/- 0.483) millimeters), a bottom diameter 128 of about 1.854 (+/- 0.043) inch (47.092 (+/- 1.092) millimeters), a wall thickness dimension 136 of about 0.225 (+/- 5 percent) inch (5.715 millimeters), a maximum diameter 168 of about 2.700 (+/- 0.062) inches (68.580 (+/- 1.575)

millimeters), and a flange vertical placement dimension 180 of about 0.334 (+/- 0.00394) inch (8.484 (+/- 0.100) millimeters) have been found to be suitable dimensions.

For a one-half pint container, a total height dimension of about 3.187 (+/- 0.073) inches (80.950 (+/- 1.854) millimeters), a top inner dimension 126 of about 2.950 (+/- 0.027) inches (74.930 (+/- 0.686) millimeters), a top outer diameter 127 of about 3.082 (+/- 0.028) inches (78.283 (+/- 0.711) millimeters), a bottom diameter 128 of about 2.493 (+/- 0.057) inches (74.752 (+/- 1.448) millimeters), a wall thickness dimension 136 of about 0.290 inch (7.366 millimeters), a maximum diameter 168 of about 3.326 (+/- 0.076) inches (84.480 (+/- 1.930) millimeters), and a flange vertical placement dimension 180 of about 0.362 (+/- 0.00394) inch (9.195 (+/- 0.100) millimeters) have been found to be suitable.

For a pint container, a total height dimension 124 of about 4.185 (+/- 0.096) inches (106.299 (+/- 2.438) millimeters), a top inner diameter 126 of about 3.535 (+/- 0.018) inches (89.789 (+/- 0.457) millimeters), a top outer diameter 127 of about 3.675 (+/- 0.018) inches (93.345 (+/- 0.457) millimeters), a bottom diameter 128 of about 3.000 (+/- 0.069) inches (76.200 (+/- 1.753) millimeters), a wall thickness dimension 136 of about 0.330 inch (8.382 millimeters), a maximum diameter 168 of about 3.940 (+/- 0.910) inches (100.076 (+/- 23.114) millimeters), and a flange vertical placement dimension 180 of about 0.375 (+/- 0.00394) inch (9.525 (+/- 0.100) millimeters) have been found to be suitable.

For a one-quart container, a total height 124 of about 4.750 (+/- 0.109) inches (120.650 (+/- 2.769) millimeters), a top inner diameter 126 of about 4.615 (+/- 0.230) inches (117.221 (+/- 5.842) millimeters), a top outer diameter 127 of about 4.769 (+/- 0.230) inches (121.133 (+/- 5.842) millimeters), a bottom diameter 128 of about 3.985 (+/- 0.920) inches (101.219 (+/- 23.368) millimeters), a wall thickness dimension 136 of about 0.370 inch (9.398

millimeters), a maximum diameter 168 of about 5.075 (+/- 0.117) inches (128.905 (+/-29.718) millimeters), and a flange vertical placement dimension 180 of about 0.375 (+/- 0.00394) inch (9.525 (+/- 0.100) millimeters) have been found to be acceptable.

In one embodiment, the present container and lid are injection-molded using a thermoplastic. Acceptable thermoplastics include high density polyethylene homopolymer, rubber-modified polyethylene homopolymer, copolymers of low and medium molecular weight high density polyethylene copolymers, ultrahigh molecular weight high density polyethylene, 20%-30% glass fiber-reinforced high density polyethylene, and cross-linked molding grade polyethylene. However, a person of ordinary skill in the art would readily identify other materials suitable for specific capacities and circumstances without undue experimentation. Identities and properties of other materials suitable for specific embodiments of the present container may be found in the Handbook of Plastics, Elastomers, and Composites, Third Edition, Charles A. Harper, Editor-in-Chief, McGraw-Hill, New York (1996), the entire disclosure of which is hereby incorporated by reference.

While one embodiment of the present container is unitary, other embodiments may have individual components, e.g., the present flange, which are formed separately and bonded together.

As stated above, the present container may be unitarily formed by injection molding using a thermoplastic and the lid 52 may be formed from the same or a similar thermoplastic used to form the container 100 and which imparts a degree of resilience and flexibility to the lid 52. Because of the flexibility inherent in the present lid 62, inserting a tool in the gap 58 between the lid 52 and the flange 56 of the prior art container 50 will simply flex the lid, but will not remove the lid from its position sealing the container. The present gap 182 enables a

user to press or pull upwardly on the lid 52, thereby more easily removing the lid 52 from the container 100.

Because numerous modifications of this invention may be made without departing from the spirit thereof, the scope of the invention is not to be limited to the embodiments illustrated and described. Rather, the scope of the invention is to be determined by the appended claims and their equivalents.